



FCC RF Exposure Evaluation

1. Product Information

FCC ID	2BCCX-X5XXLS
Product name	SIGN RISE FEEL MOVE
Model number	X565LS-X520LS-X580LS-X590LS
Power supply	Input: 5V=0.5A or Input: 7.2V Supplied by 2*ER14505 batteries
Hardware Version	C042
Software Version	S107
NFC	
Operating Frequency	13.56MHz
Modulation Type	ASK
Antenna Description	PCB Antenna, 0dBi (max.)
Lora	
Frequency Range	902.3MHz, 915.2MHz, 927.5MHz
Modulation Type	GFSK
Antenna Description	PCB Antenna, 1.32dBi(Max.)
Exposure category	General population/uncontrolled environment
EUT Type	Production Unit
Device Type	Mobile Devices

2. Evaluation Method

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modelled or measured field strengths or power density, is ≤ 1.0 . The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.





3. Limit

3. 1 Refer Evaluation Method

[ANSI C95.1-1999](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

[FCC KDB publication 447498 D01 General 1 RF Exposure Guidance v06](#): Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

[FCC CFR 47 part1 1.1310](#): Radiofrequency radiation exposure limits.

[FCC CFR 47 part2 2.1091](#): Radiofrequency radiation exposure evaluation: mobile devices

3. 2 Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100)*	6
3.0 – 30	1842/f	4.89/f	(900/f ²)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100)*	30
3.0 – 30	824/f	2.19/f	(180/f ²)*	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	/	/	f/1500	30
1500 – 100,000	/	/	1.0	30

F=frequency in MHz

*=Plane-wave equivalent power density

4. MPE Calculation Method

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the center of radiation of the antenna

5. Antenna Information

Ceramics Antenna can only use antennas certificated as follows provided by manufacturer;

Internal Identification	Antenna type and antenna number	Operate frequency band	Maximum antenna gain	Note
Antenna	PCB Antenna	902.3MHz~927.5MHz	1.32dBi	Lora Antenna
Antenna	PCB Antenna	13.56MHz	0dBi	NFC Antenna



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6. Conducted Power

[NFC]

Test Procedure

TX frequency range: 13.56MHz(Worst result)

NFC limit is 60.77V/m

Max. Field Strength: 47.72dBuV/m @3m

20cm Maximum Field Strength: $47.72 \text{ dBuV/m} + 40\lg(3m/0.2m) = 94.76 \text{ dBuV/m} = 0.05 \text{ V/m}$

[Lora]

Test Procedure

TX frequency range: 927.5MHz(Worst result)

Device category: Portable device (Distance: 20cm)

Max. Field Strength: 97.83dBuV/m @3m

$EIRP = E-104.7 + 20\log D = 97.83 - 104.7 + 20\log 3 = 2.67 \text{ dBm}$

Maximum Conducted Output Power: 2.67dBm

Turn up: 2.0 ± 1

7. Measurement Results

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, $r = 20\text{cm}$, as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

[Antenna]

<NFC>

Band/Mode	Maximum Field Strength (V/m)		Limits (V/m)		MPE1
ASK	0.05		60.77		0.0008

< Lora >

Band/Mode	RF output power		Antenna Gain (dBi)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)	MPE2
	dBm	mW				
GFSK	3.0	1.9953	1.32	0.0005	0.61	0.0008

Mode	MPE1 Max.	MPE2 Max.	Σ MPE ratios	Limit	Results
NFC+ Lora	0.0008	0.0008	0.0016	1.000	Pass

Remark:

1. Output power including tune-up tolerance;
2. MPE evaluate distance is 20cm from user manual provide by manufacturer;



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8. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

.....THE END OF REPORT.....



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